Benjamin Walter **cve303**
Assignment Indep_and_Rand_Variables due 03/10/2019 at 11:00pm EET

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1. **(1 point)** `METUNCC/Statistics/indep.pg`

In each of the problems below use the fact that A and B are **independent** events to compute the missing value.

(i) Given $\mathrm{P}(B) = \frac{1}{10}$ and $\mathrm{P}(A \cap B) = \frac{2}{25}$
Compute $\mathrm{P}(A) =$_____

(ii) Given $\mathrm{P}(A \mid B) = \frac{3}{10}$ and $\mathrm{P}(A \cap B) = \frac{1}{20}$
Compute $\mathrm{P}(B) =$ _____

(iii) Given $\mathrm{P}(A) = \frac{7}{8}$ and $\mathrm{P}(A \mid B) = \frac{7}{8}$ and $\mathrm{P}(B \mid A) = \frac{9}{10}$
Compute $\mathrm{P}(B) =$ _____

(iv) Given $\#(A) = 32$ and $\#(B) = 16$ and $\#(\text{Total}) = 64$
Compute $\#(A \cap B) =$ _____

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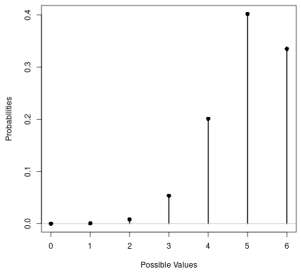
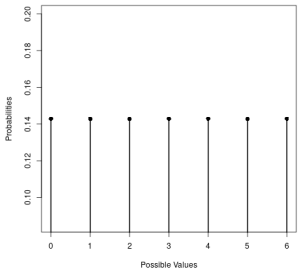
2. **(1 point)** `METUNCC/Statistics/pmf_match.pg`
Match the following random variables with their pmf and cdf graphed below.

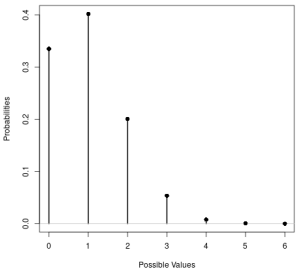
- X is randomly pick a number between 0 and 6 (inclusive): [pmf?/a/b/c/d] [cdf?/A/B/C/D]
- X is roll 6 dice and count number of rolls $= 1$: [pmf?/a/b/c/d] [cdf?/A/B/C/D]
- X is roll 6 dice and count number of rolls $\neq 1$: [pmf?/a/b/c/d] [cdf?/A/B/C/D]
- X is flip 6 fair coins and count number of Heads: [pmf?/a/b/c/d] [cdf?/A/B/C/D]



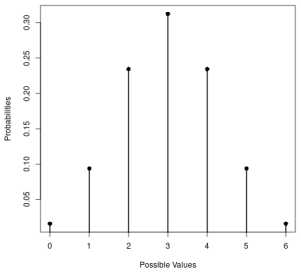
(a)



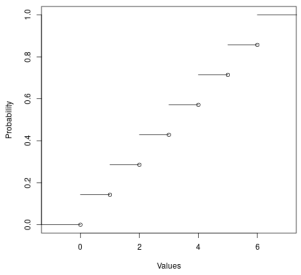
(b)



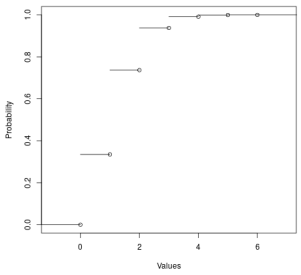
(c)



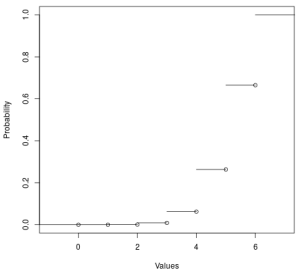
(d)



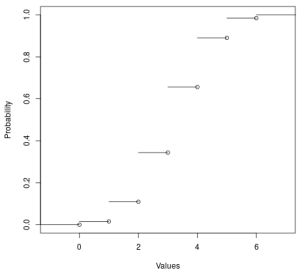
(A)



(B)



(C)



(D)

3. **(1 point)** METUNCC/Statistics/E_Var.pg

The random variable X takes the values $[-5,-4,-1]$ with the pmf given below:

x	-5	-4	-1
$f(x)$	$\frac{1}{10}$	$\frac{7}{10}$	$\frac{1}{5}$

Compute the following values.

Expected Values

$\mathrm{E}[X] =$ _____

$\mathrm{E}[X^2] =$ _____

Variance

$\mathrm{Var}[X] =$ _____

(Hint: use your answers from the first section to compute this.)

Linear Transformations

$\mathrm{E}[3X] =$ ___

$\mathrm{E}[X+3] =$ ___

$\mathrm{Var}[3X] =$ _____

$\mathrm{Var}[X+3] =$ _____

(Hint: use your answers from the previous sections to compute these.)

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4. **(1 point)** METUNCC/Statistics/binom.pg

For the problems below, you may either enter a numeric answer (accurate to 3 significant digits), or the R code which generates the answer.

(Your answer will be checked by R.)

A student attends 76% of his lectures each semester. Compute the following probabilities for a course which consists of 30 lectures during the semester.

The probability that the student attends **exactly** 23 lectures. _____

The probability that the student attends **less than** 18 lectures. _____

The probability that the student attends **more than** 27 lectures. _____

The probability that the student attends **between** 13 and 24 (inclusive) lectures. _____

You may use the embedded R window below to check your code and perform computations.

Embedded R window.

Recall that if $X \sim \text{Binomial}(n,p)$ then the pdf and cdf of X are computed in R by the commands:

$f(x) == \mathrm{P}(X = x) ==$ dbinom(x, n, p)

$F(x) == \mathrm{P}(X \le x) ==$ pbinom(x, n, p)

For example

dbinom(4, 10, 1/2) computes the probability that flipping a coin 10 times will result in **exactly** 4 Heads.

pbinom(7, 10, 1/2) computes the probability that flipping a coin 10 times will result in 7 Heads **or less**.

1 - pbinom(3, 10, 1/2) computes the probability that flipping a coin 10 times will result in 4 Heads **or more**.